Imagine COMMUNICATIONS™

Installation and Operation Manual

UDC-RCU

Master Clock

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Publication Information

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Icons Used In This Manual

Caution: This icon signifies a potential hazard, and gives tips on how to avoid them.

Important Information: This icon indicates to an important step that must be followed.

Technical Note: This icon describes technical terms and actions.

Helpful Hint: This icon suggests the general setup and practice.

Printing

While optimized for onscreen viewing, the pages of this manual are formatted for printing on 8 1/2" x 11" and A4 sized paper, giving you the option to print the entire manual or just a specific page or section.

Compliance

CE Marking

Electromagnetic Compatibility 2004/108/EC

Tested and Conforms to the following EMC standards :
EN 61000-4-2:1995 +A1:1998 +A2:2001 (Electrostatic Discharge)
EN 61000-4-3:2006 +A1:2008 (RF Immunity)
EN 61000-4-4:2004 (Fast Transient Common Mode)
EN 61000-4-5: 2006 (Surge)
EN 61000-4-6: 2007 (RF Injection Common Mode)
EN 61000-4-8: 1993 +A1:2001 (Power Frequency Magnetic Field)
EN 61000-4-11: 2004 (Voltage Dips)

EN 61000-6-3:2001 (EMC Emissions Generic Commercial)
EN 55022:2006 +A1:2007
CISPR 22:2008
ANSI C63.4:2009

EN 61000-3-2:2006 +A1:2009 +A2:2009 (Harmonic Current Emission)

EN 61000-3-3:2008 (Voltage Fluctuations and Flicker)

Low voltage directive 2006/95/EC

Tested and Conforms to the following Safety standards:
EN 60950-1:2006 (Safety of Information Technology Equipment)

FCC Statement

This device complies with Part 15 of the FCC Rules and found to comply with the limits for a Class B digital device. These limits are designed to provide reasonable protection against harmful interference in a commercial/residential installation.

Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

WEEE

Waste Electrical and Electronic Equipment Directive (WEEE) 2002/95/EC

The UDC-RCU is considered WEEE Category 9 (Monitoring and Control Instruments Equipment) as defined by the WEEE Directive and therefore fall within the scope of the WEEE Directive.

RoHS

Compliant by Exemption

Restriction of the Use of Certain Hazardous Substances Directive 2002/95/EC

The RoHS directive covers the same scope of electrical and electronic equipment that are under the WEEE directive, except that Category 8, Medical Devices, and Category 9, Monitoring and Control Instruments, which are under WEEE, are excluded from the RoHS directive.

This device fall under the category of Monitoring and Control Instruments Equipment (Category 9 as defined in Annex 1A of WEEE 2002/96/EC Directive) which is excluded from the RoHS directive 2002/95/EC (reference Article 2, paragraph 1) requirements.

These products are manufactured using lead in the soldering process as allowed for items excluded from the RoHS directive. These units are RoHS Compliant only in that they are excluded from the RoHS directive under Category 9, Monitoring and Control Instruments.

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Introduction

The UDC-RCU is a programmable, single channel, timer control unit. The UDC-RCU will communicate with a single or multiple DTD-A19B2 digital time displays (i.e. remote display).

Features

- Rubber feet for tabletop use.
- Daylight Saving Time configuration.
- Control multiple devices simultaneously.
- Modes include count-down, count-up and clock.
- Current mode select indicated by illuminated button.
- All configuration settings retained in non-volatile flash memory.
- Uses RJ12 (6P6C) modular cable to interface with remote displays.
- Six digit LED display shows what the remote device/devices are displaying.
- RTC (Real Time Clock) backup retains time during loss of power or reference.
- Time zone offsets.

General Use Precautions

Do not expose this device to temperatures outside the range of 32˚ to 140°F (0˚ to 60˚C). Placing your device in an environment that is too cold or humid may damage the unit. Do not place heavy objects on top of this device or use excessive force on it. Never use benzene, paint thinners, detergent or other chemical products to clean the outside of this device.

Please refer to the "Care and Cleaning" section of this document for details on cleaning and recommended products.

The warranty may be void as a result of the failure to respect the precautions stated above.

Only qualified persons are authorized to carry out maintenance on this device. Read this User's Manual carefully, and follow the correct procedure when setting up the device. Do not open your Masterclock product or attempt to disassemble or modify it.

Never insert any metallic object into the unit's case, doing so increases the risk of electrical shock, short circuiting, fire or personal injury.

Never expose this device to rain or use it near water or in damp or wet conditions. Never place objects containing liquids on or near this device, as they may spill into its openings increasing the risk of electrical shock, short circuiting, fire or personal injury.

Unpacking and Installation

Supplied (Ship Kit)

The list below is for illustration purposes. Refer to your sales order for actual items shipped.

- UDC-RCU
- 6P6C modular cable (50') with RJ12 connectors
- CD-ROM (User Manual)
- AC power cord with IEC plug

Connections

The UDC-RCU is supplied with an AC power cord and communication cable depending on options. Shown below with AC power cord and 6P6C cable connected.

IEC socket AC power	RJ12 port RS485 communications (DTD-A19B2 digital time display(s))	RJ45 port (not used)

Power

AC

All AC power cords have a standard IEC female plug on one end and a male plug on the other.

Interface

The top panel provides immediate access to all major UDC-RCU functions. The panel consists of a 6 digit, 7 segments LED display along with three sets of pushbuttons.

Status LED

The colons on the LED display are used to alert the user of lock to time reference.

Colons	Description
Flashing	Time is not able to be decoded from the time reference or the reference is not present. Time displayed on the face of the unit is based upon internal RTC and may not be accurate.
On Solid	The unit acquired valid time and has synchronized its internal RTC to the time reference. The internal clock time is considered accurate.

Button Assignments

Modes

There are three mode buttons: CLOCK, UP and DOWN. Each mode performs a different operation and is listed in the table below.

Mode	Description
CLOCK	Display UTC time plus any Time Zone and/or DST information. {Standalone Menu} Exit standalone menu.
UP	Perform a count up or stop watch routine. {Clear Preset} In current mode, press to set the preset to 00:00:00.
DOWN	Perform a countdown routine. {Clear Preset} In current mode, press to set the preset to 00:00:00. {Standalone Menu} Navigate the menu options (i.e. roll through).

Set

There are three set buttons: HOUR, MINUTE and SECOND. Besides adjusting the counter preset, the buttons are used to change settings in the standalone menu.

Set	Description
HOUR	Select a preset of 0 – 24 hours. {Standalone Menu} Select a negative (-) Time Zone offset.
MINUTE	Select a preset of 0 – 59 minutes.
SECOND	Select a preset of 0 – 59 seconds.

Action

There are three action buttons: START, PAUSE and STOP.

Set	Description
START	Initiate or resume the count routine.
PAUSE	Pause the running count.
STOP	Terminate the count routine and reset preset for next routine.

Time Zone Offsets
A time zone offset or bias can be used to adjust the time for display purposes. This can be set as a positive (+) offset indicating that the unit leads the UTC time or negative (-) offset value indicating the unit lags behind UTC time.

The UDC-RCU interprets time input as UTC. If the time reference to this unit is not UTC, do not adjust the time zone and/or DST offset.

Daylight Saving Time
An automatic DST setting can be configured separately and in addition to a time zone offset.

The UDC-RCU provides flexible configuration options supporting most DST standards.

U.S.A. and Canada
On August 8, 2005, the Energy Policy Act of 2005 was signed. This Act changed the time change dates for Daylight Saving Time in the U.S, effective in 2007. DST now begins on the second Sunday of March at 2:00 AM (Local Time) and end the first Sunday of November at 2:00 AM (Local Time).

EU Standard – European Union
In the European Union, daylight change times are defined relative to the UTC time of day instead of local time of day (like in the U.S.). For the European Union, summertime period begins at 1:00 AM UTC on the last Sunday of March and ends at 1:00 AM UTC on the last Sunday of October. Please carefully consult the section entitled "Device Settings" for details on setting daylight time.

To ensure proper hands-free year-around operation, DST adjustments must be configured using the daylight time option and not with the time zone offset option.

Freewheeling Accuracy
The UDC-RCU has built-in provisions to allow the clock to freewheel and maintain accuracy for extended periods in the absence of time reference. These features also allow the unit to be set manually and operate without time code.

TCXO and RTC circuit
The UDC-RCU contains a precision TCXO and RTC circuit allowing the clock to maintain an accuracy of +/- 1 minute per year to the last known time code input (+/- 165 mS per day) when a time reference is not preset or cannot be decoded (i.e. freewheeling mode).

Maintenance-free Rechargeable Battery
The RTC and TCXO are maintained continuously from a rechargeable battery circuit during periods of power outage. Minimum holdover period is two weeks once the battery is charged. The battery will automatically charge when the unit is next powered and requires no maintenance.

Non-Volatile Configuration
The configurations are maintained in non-volatile memory allowing the current settings to be retained during power outages.

Operation

Overview

The UDC-RCU is a programmable, single channel, timer control unit. The UDC-RCU will communicate with a single or multiple DTD-A19B2 digital time displays (i.e. remote display).

The combination of LED display and illuminated buttons, indicate the selected mode and current step being performed.

RS485 Communication

DTD-A19B2 digital time displays are connected to the UDC-RCU using the RS485 (RJ12) port and a 6 wire (6P6C) modular cable.

Time stamps are sent from a connected DTD-A19B2 to the UDC-RCU every several seconds. The accuracy of the time is dependent upon the referenced time in the DTD-A19B2.

To control multiple DTD-A19B2 digital time displays using a single UDC-RCU, connect each DTD-A19B2 and the UDC-RCU to a 6P6C male splitter. Any DTD-A19B2 connected will receive commands sent from the UDC-RCU.

6-way splitter

1. UDC-RCU
Connect one end of a 6P6C cable to a UDC-RCU and the other end to a splitter.

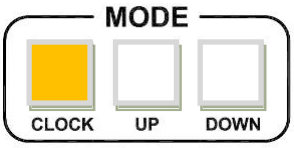
2. DTD-A19B2
Connect one end of a 6P6C cable to a DTD-A19B2 digital time display and the other end to the same splitter as the UDC-RCU.

Examples
There are three modes of operation.

- Clock
- Count Up
- Countdown

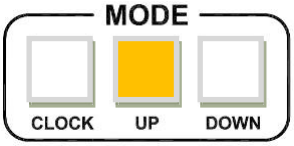
Below are a few scenarios of how to program and run a routine.

Clock
Press [CLOCK] to exit the "Up" or "Down" mode or the standalone configuration menu.

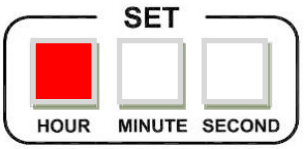


Please refer to the "Configuration" section of this document for details on the standalone menu.

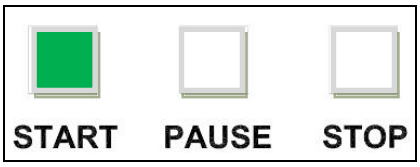
Count Up
Select the mode of operation by pressing the button labeled [UP].



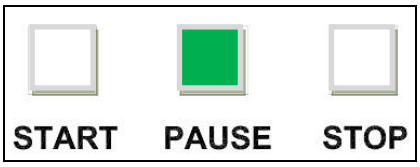
Enter the end number (preset) by pressing the [HOUR], [MINUTE] or [SECOND] buttons. With each corresponding button pressed, the digit on the display will increment.



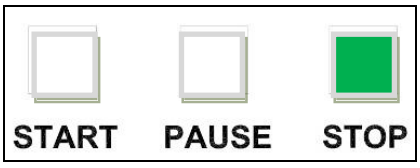
Press [START] to send a command to the remote display and start the routine. The display will show the running count. At the end of the routine, the display on the UDC-RCU and remote display will flash three times and hold for a command.



During a routine, press [PAUSE] to freeze the running count. To continue, press [START] and the routine will continue from its paused count.

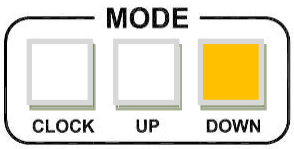


To end a running count before its end number is reached; press [STOP] and the count will reset back to the preset (i.e. end number) and hold for the next command.

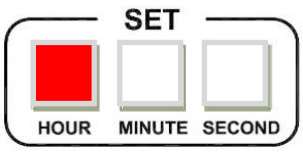


Countdown

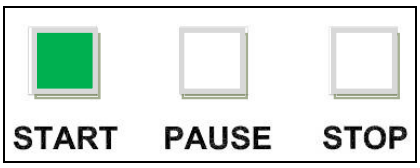
Select the mode of operation by pressing the button labeled [DOWN].



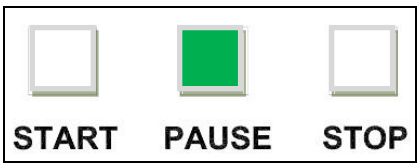
Enter the start number (preset) by pressing the [HOUR], [MINUTE] or [SECOND] buttons. With each corresponding button pressed, the digit on the display will increment. Press and hold to enter a rapid movement.



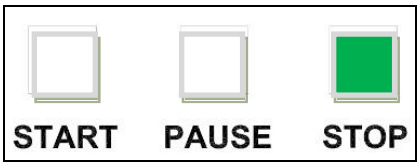
Press [START] to send the command to the remote display to start the routine. The display will show the running count. At the end of the routine, the display on the UDC-RCU and remote display will flash three times and hold for a command.



During a routine, press [PAUSE] to freeze the running count. To continue, press [START] and the routine will continue from its paused count.



To end a running count before its end number (i.e. 0) is reached; press [STOP] and the count will reset back to the preset (i.e. start number) and hold for the next command.



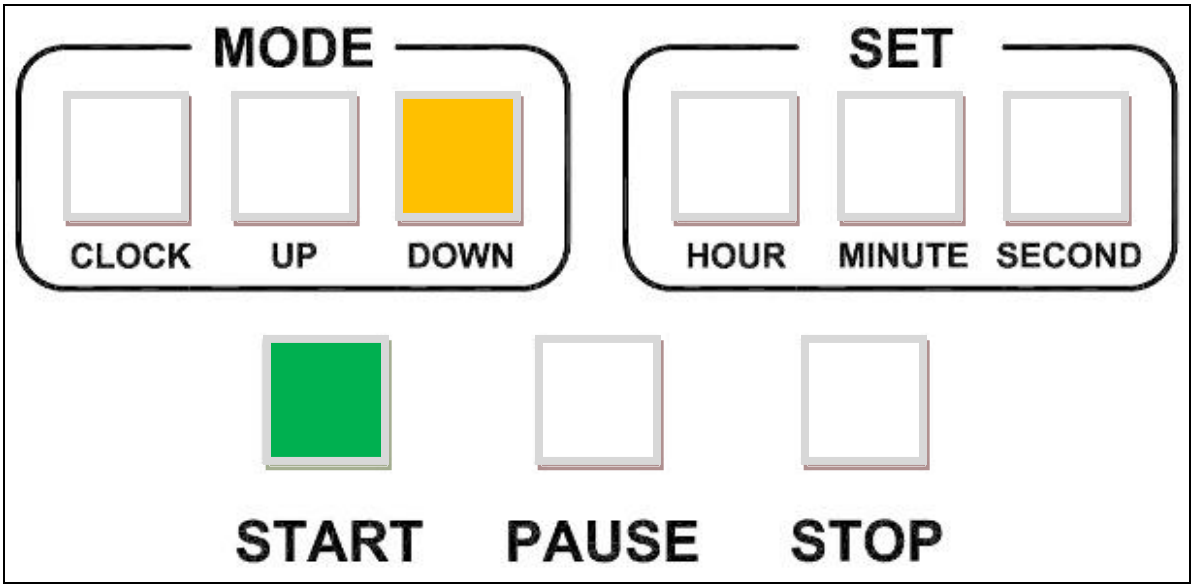
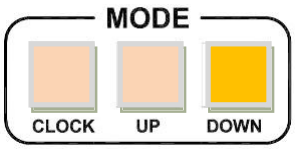
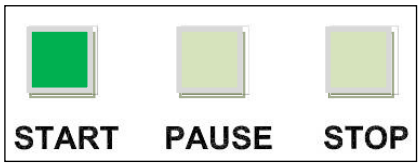


Illustration above shows the UDC-RCU performing a countdown routine.





COUNT TO TIME

Select the "Count to Time" mode by pressing and holding the [DOWN] button for 2 seconds. The [DOWN] button should begin to steadily flash.

Enter the end real time of the count up by pressing the [HOUR], [MINUTE] and/or [SECOND] buttons. With each corresponding button pressed, the digit on the display will increment. Enter the Real Time that you want to the display to countdown toward in a 24hour timescale. (e.g.: if the current time is 1:05pm and you want to countdown towards 1:30pm program the unit to 13:30. At the end of the routine, the [DOWN] button will continue to flash indicating the UDC-RCU is currently in Count to Time mode.

Press the [START] button to send a command to the remote display and start the Count to Time. The display will show the running count to time displaying the countdown or remaining hours, minutes, and seconds until the preprogrammed real time. The preprogrammed real time may reference local or UTC or whatever "real time" was programmed into the UDC-RCU prior to the initialization of the count time.

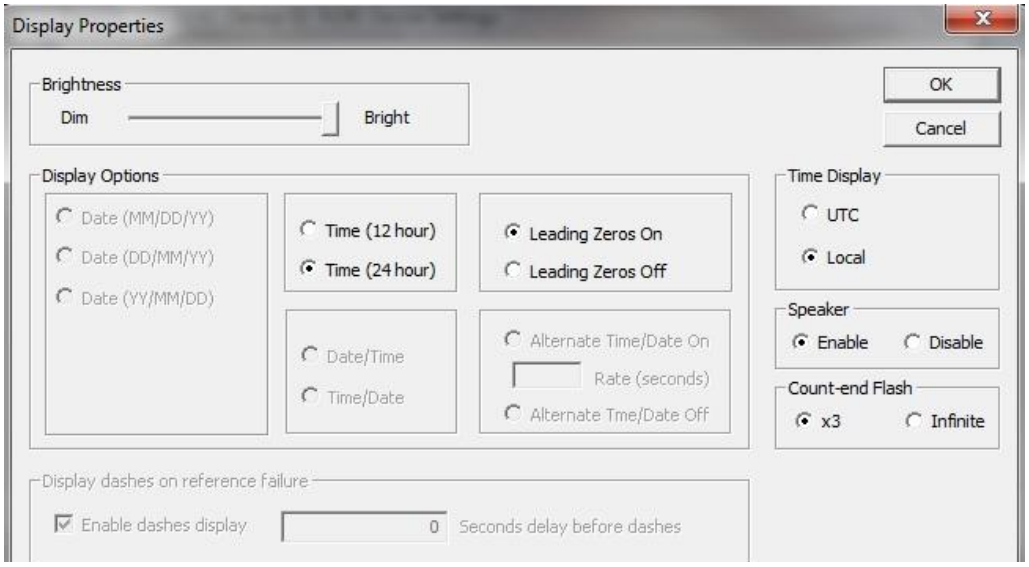
You cannot freeze the Count to Time routine.

To abandon the existing Count to Time, press [DOWN] again.

To release the display device, press [CLOCK].

UDC-RCU **will auto adjust for Daylight Savings Time and Leap seconds. Therefore, if the** UDC-RCU **is counting down towards a time between 0200 and 0259 on the first morning of Daylight Savings Time, the count will advance 24 hours to the first "available" time of 02**; because that time does not exist on that morning**.

The Count to Time feature will automatically count down towards the next real time programmed into the UDC-RCU. **Depending on the settings in WinDiscovery, the** UDC-RCU **will then perform a Count-end flash and commence a negative count upwards from zero removing leading zeros. Or, will then infinitely flash all zeros.**



Configuration

Standalone Menu Display Properties

The UDC-RCU can be customized to display time in a variety of formats and brightness levels.

To enter the configuration menu press and hold [CLOCK] for approximately 2 seconds.

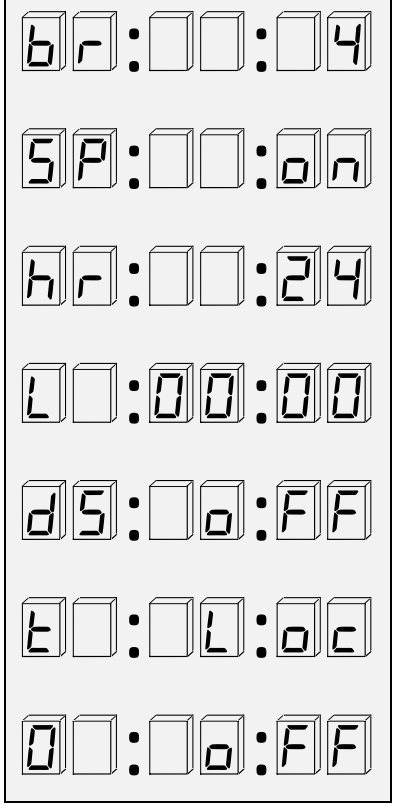
Press [DOWN] to cycle through the configuration menu.
Press [HOUR], [MINUTE] and [SECOND] to change settings.
Press [CLOCK] to exit the configuration menu.

Each menu setting will be saved until a user makes a change to the setting or the unit is reset to factory default.

Factory default settings are:

Brightness:	4
Speaker:	On
Time Display Format:	24 hour
Time Zone Offset:	0
Daylight Saving Time:	Off
Time Displayed:	Local
Leading Zero:	Off

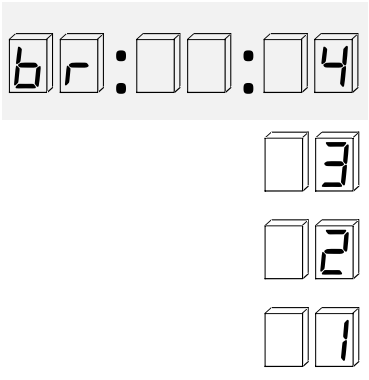
Default Settings



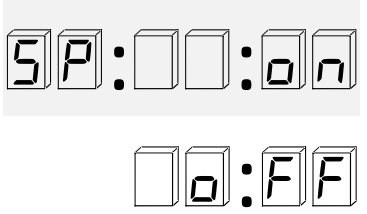
Brightness
This setting controls the brightness of the LED display and illuminated buttons.

There are four levels of brightness.

Brightest:	4
Bright:	3
Dim:	2
Dimmest:	1

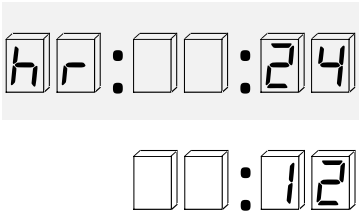


Speaker
When enabled, the unit will emit a short audible tone (3.7kHz) during initialization and at the end of each timer count.



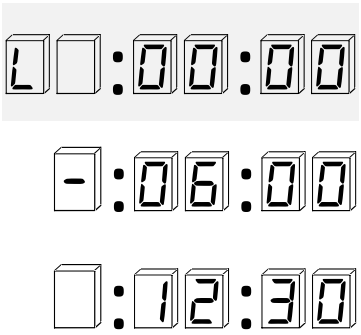
When speaker is set to off, the unit will continue to emit a short audible tone during initialization.

Time Display Format
The unit can display time in 24 or 12 hour formats. When set to 12 hour format, the AM/PM indicator will be on during the PM hours.

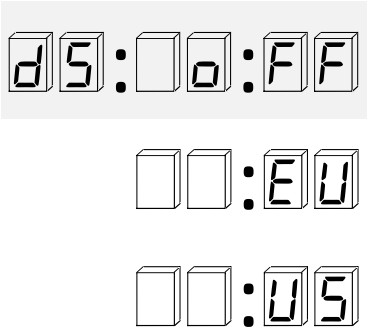


Time Zone Offset
To have the unit display time other than UTC, press [HOUR] to select positive (+) or negative (-), press [MINUTE] to select the hour and press [SECOND] to select the minutes.

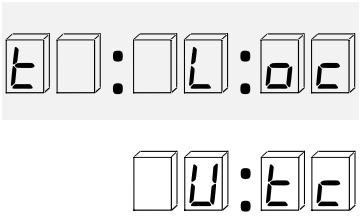
Do not adjust for DST in Time Zone Offset. Set DST from the next menu setting, Daylight Saving Time.



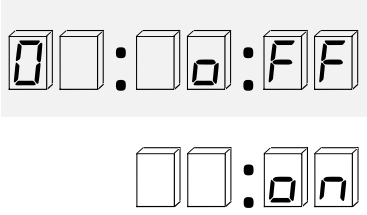
Daylight Saving Time
There are three options for DST settings. For information of standards for United States/Canada and European Union DST, please refer to the section, "Daylight Saving Time" in the previous section of this manual.



Time Displayed
In addition to time zone offset, the display can show UTC or local time (i.e. time zone offset + daylight saving time).



Leading Zero
This feature will allow a "0" to be displayed for the first digit, between the hours of 1 and 9.



The UDC-RCU "Display Properties", will not affect the remote clock display settings.

Changes made using WinDiscovery, will over-write the standalone settings and vice versa.

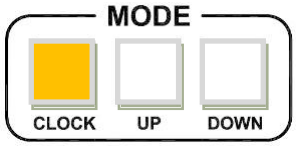
Custom Time Menu

There are situations where the end-user needs to display time differently than from a time reference. When the custom time is used, the time displayed will not have Time Zone offsets or DST applied. However the time can be displayed in 12 or 24 hour format.

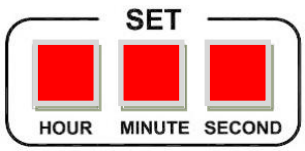
Please refer to "Standalone Menu Display Properties" in the previous section of this document for configuration of display settings.

To use the custom time feature, any external time reference (i.e. time stamp) has to be removed from the UDC-RCU RJ12 input. If the UDC-RCU is receiving time stamps, it will display this time, not the custom time entered.

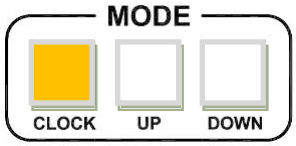
To enter the custom time menu, press [CLOCK]. If you entered the custom time menu accidently, press [CLOCK] to cancel and return to clock mode.



Enter the time, in 24 hour format, by pressing the [HOUR], [MINUTE] and [SECOND] buttons until all dashes (--) are replaced with digits. With each corresponding button pressed, the digit on the display will increment. Press and hold to enter a rapid movement.



Press [CLOCK] to exit the menu and display the custom time.



If dashes (--) are displayed, the time will not be set and the display will revert back to the internal RTC time.

When the custom time is no longer needed, there are three ways to restore time.

- Receive time stamps from a DTD-A19B2 via 6P6C modular cable
- Cycle power by removing the AC power cord for a few seconds
- Reset UDC-RCU to factory defaults

Please refer to "Reset Configuration to Factory Default" in the next section of this document for details on resetting the UCD-RCU. All user configurations will be cleared.

Reset Configuration to Factory Default
In some situations it may be necessary to return the unit to factory default settings.

1. Located on the rear of the unit is the pinhole to the reset button (i.e. next to the RJ45 Ethernet port).

2. While the unit is powered on, insert a non-metallic reset tool straight through the pinhole and hold the button for proximity 5 seconds or until the display shows dashes.

Default Settings	
Brightness:	4
Speaker:	On
Time Display Format:	24 hour
Time Zone Offset:	0
Daylight Saving Time:	Off
Time Displayed:	Local
Leading Zero:	Off
Display dashes:	Disabled

The unit will go through an initialization process. Next, the UDC-RCU will show the time on the display.

Reset button through pinhole

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Specifications

Communications I/O

Connectors

RJ12 .....Communication with DTD-A19B2 Digital Time display
RJ45 .....(not used)

Power

AC

Voltage .....100-240 VAC
Frequency .....50/60 Hz
Consumption.....5 W
Connector.....Universal IEC input connector

There are no user serviceable parts inside the UDC-RCU Timer Control Unit.
Please contact Image Communications Corporation. if you require servicing or repair.

Internal Battery Circuit

Maintenance Free Rechargeable Battery

3V, 17 mAh, Coin Cell
Rechargeable Manganese Lithium
Panasonic ML1220/V1A

Rechargeable Manganese Lithium coin cell (Panasonic ML1220) and recharging circuit requires no maintenance and retains all configuration settings for two weeks (minimum holdover) without applied external power.

Operating/Storage Temperature and Humidity

Operating Temperature ..... 32˚ to 140°F (0˚ to 60˚C)
Relative Humidity ..... 0 to 90%, non-condensing
Storage Temperature ..... -40° to 185°F (-40° to 85°C)

Size and Weight

Width ..... 6.82" (17.32cm)
Length ..... 5.24" (13.31cm)
Depth ..... 2.37" (6.02cm)
Weight 2.2lb (35.2oz)

Troubleshooting

Unable to communicate to slave display / clock

Possible reasons/solutions:

1. Verify the correct RJ12 (6P6C) modular cable is being used (i.e. 6 conductor).
2. Verify all connections are secure between the UDC-RCU and slave display/clock.
3. Check to make sure power is applied to all devices.
4. Check the cables for hard bends, kinks, or cuts.
5. Verify that the correct adapters and splitters are being used (i.e. 6P6C).

Colons are flashing / Time is incorrect

Possible reasons/solutions:

1. The UDC-RCU is not currently connected to a valid time reference.
2. There is a problem with the cabling between the UDC-RCU and the time reference. Verify that all cables and connectors are in good condition.

Unable to lock to time code

Possible reasons/solutions:

1. UDC-RCU is not currently connected to a valid time code source.
2. Verify that all cables are properly connected.
3. Verify that all cables and connectors are in working condition.
4. The time code format being fed to UDC-RCU is not recognized format.
5. Verify the time code reference is a format supported by the UDC-RCU.
6. Signal level of time code is not at acceptable levels.

Not displaying the correct local time.

Possible reasons/solutions:

1. The unit is not receiving time code. Verify that the colons on the LED display are on solid.
2. The time reference is referenced to UTC but your local time zone reference of your time reference and then set the time zone offset to arrive at a correct local time.
3. If the time reference is already providing time with local time zone and/or DST offsets, then set the time zone and/or DST offset of the UDC-RCU to UTC. If the time reference is providing UTC time, then configure your UDC-RCU to have a local time zone and/or DST offset.
4. Your time reference is not providing the time/date that you expect. Contact the individual responsible for the time reference for more information.

DST is not properly negotiated

Possible reasons/solutions:

1. Verify the DST is enabled on UDC-RCU
2. Verify that the correct format of DST is enabled (US/EU).
3. Check to make sure that you do not have DST enabled on both clocks and UDC-RCU.

Care and Cleaning

Adherence to regular and proper cleaning procedures is recommended to preserve appearance. Scratched or otherwise damaged lens caused by misuse, mishandling and improper storage or improper cleaning is not covered under the limited warranty.

Job Site Precautions
It is recommended the unit be removed and stored in a protective area during painting and/or construction.

Stainless Steel Case
If your unit has a stainless steel case, a cleaner and polish designed for use on stainless steel is recommended. Use a recommended product to maintain and protect the stainless steel finish while resisting water spots and fingerprints.

Compatible Cleaners and Polish
The following cleaning and polish agent has been found to be compatible with the stainless steel case finish. Manufacturer's instructions should be followed. Magic® Complete™ Stainless Steel Cleaner and Polish Spray (Magic American Products.

Washing to Minimize Scratching
Fresh paint splashes, grease and smeared glazing compounds can be removed easily before drying by rubbing lightly with a good grade of naphtha or isopropyl alcohol. Follow the alcohol rub with a mild detergent wash with warm water and end with a thorough rinsing with clean water using a clean damp lint free cloth.

Foreign Substance Removal

- Butyl Cellosolve (For removal of paints, marking pens, lipstick, etc.)
- The use of adhesive tape or lint removal tools work well for lifting off old weathered paints.
- To remove labels, stickers, etc., the use of kerosene, naphtha or petroleum spirits is generally effective. When the solvent will not penetrate sticker material, apply heat (hair dryer) to soften the adhesive and promote removal. Gasoline should never be used.

UDC-RCU Service and Support

For service and support, telephone the Image Communications Customer Service Department at **1-888-534-8246**. If the problem cannot be resolved over the telephone and the instrument must be shipped to Image Communications for service or repair:

- Obtain a Return Authorization (RA) number from the Image Communications Customer Service Department.
- Attach a tag to the unit with the following information:
  - Your company name, address, and telephone number
  - The name of the contact person at your company
  - The RA number
  - The unit serial number
  - An explanation of the problem
- To prevent shipping damage, pack the unit the same way Image Communications had packed it. If possible, use the original packing materials in the original shipping container.
- Ship the unit to the following location:
  Image Communications Corporation
  Videotek Test and Measurement
  243 Shoemaker Road
  Pottstown, PA 19464-6433
  Attn: RA *xxxx* (where *xxxx* is the RA number)
  Email: BCDService@Imagecommunications.com